Abstract Title Page

Title:
Using Design Experiments to Understand Secondary Classroom Comprehension Practices.

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Abstract Body.

Background / Context:
Adolescents in the United States and their teachers face an enormous academic challenge with respect to reading comprehension. College and career readiness standards outlined in the Common Core (2012) place increased emphasis on preparing students to read increasingly complex text across a range of disciplinary content areas. At issue is how to develop the necessary skills and understandings to read the texts required of college and literacy-demanding occupations when fewer than 35% of students in secondary grades read proficiently (U.S. Department of Education, 2012, NCES 2012-457). Compounding the challenge is the reality that secondary-level courses are largely focused on disciplinary content where reading skills are assumed prerequisites and not an instructional priority (Kamil, Borman, Dole, Kral, Salinger, & Torgesen, 2008; Kennedy & Ihle, 2012). In addition, students must be able to proficiently read and understand a variety of complex text across several core content areas. Thus, in addition to the complex vocabulary, phrasing, and sentence and text structure found in secondary texts, adolescent students must deal with differences in how the vocabulary and text structures are used in various disciplines (Carnegie Council on Advancing Adolescent Literacy, 2010; Heller & Greenleaf, 2007; Lee & Spratley, 2010). The increased demands to read and learn from complex text and the reading proficiency levels of today's adolescents bring into sharp relief the academic chasm that exists in secondary classes (Eason, Goldbert, Young, Geist, & Cutting, 2012) and the need to engage content-area teachers in the solution.

Recognizing that secondary students are unlikely to meet the intentionally high goals of the CCS without improving outcomes in both reading comprehension and content learning, we sought to develop and implement an intervention that would align with content learning, improve reading comprehension, and be feasible for use by content area teachers in secondary schools. We used design experiment methodologies to better understand the contexts of secondary content-area instruction and the potential of teacher-directed and student-regulated English language arts and social studies interventions in middle and high school contexts. Our goal was to study the instructional contexts and align our practices with the realities of classrooms. To understand the instructional and disciplinary context of English language arts and social studies classrooms, we spent several months working with middle and high school teachers nominated by district administrators as experts.

Purpose / Objective / Research Question / Focus of Study:
Design experiments were conducted to examine the potential and feasibility of two interventions to improve student content knowledge and reading comprehension: Team-based Learning in social studies and Critical Reading Practices (teacher-directed and student-regulated comprehension practices) in English language arts. Both studies examined common research questions including (a) the potential and feasibility of two interventions, (b) intervention refinements, and (c) receptivity and perceptions of users. In this session we will present lessons learned and how design experiments shaped instructional procedures and practices.

Setting:
The English language arts and social studies design experiments were both conducted in classrooms in three school districts in two states, representing rural, suburban, and small urban areas.

Population / Participants / Subjects:
Twelve social studies and seven English language arts teachers participated in the design studies. Teachers were nominated by their principal as expert teachers in their field. In order to be nominated, teachers were required to have at least three years of teaching experience, high ranking on evaluations, deep knowledge of content, and a willingness to commit to the study.

Intervention / Program / Practice:
A design experiment methodology was used to define and refine interventions through multiple iterations. Because this was a prototype building process, intervention components were introduced over time and implemented in 1-2 week installments. Following we describe the essential components of the English language arts and social studies intervention.

Critical Reading Practices was developed for English language arts and consisted of three primary phases. Phase 1 Text Set-Up was teacher-directed and designed to build and activate students' background knowledge of concepts, vocabulary, text structure, and text features. Phase 2, Text Analysis, was initially teacher-directed then transitioned to student regulated activities. In this phase students learned and applied comprehension monitoring techniques and engaged in text-based discussions with peers to extend and clarify understanding. In Phase 3, Text Synthesis, students worked with partners to summarize major events and findings from text and record on graphic organizers. Recorded information was then used to prepare for quizzes, written responses, or classwide discussions.

Based on previous reading and content learning approaches (Gersten, Baker, Smith-Johnson, & Domino, 2006; Vaughn et al., 2009), we identified content related instructional foci for social studies: (a) an overarching issue or question that served as a comprehension canopy for the instructional unit, (b) essential words or key vocabulary related to the unit, (c) a springboard or motivating video or idea that related to the unit, (d) appropriate text based instruction and reading, and (e) team based learning to promote text based discussions and evidence building.

Research Design:
We conducted a series of iterative design experiments across the school year with the teachers in each content area (English language arts and social studies) in order to analyze feasibility and teacher and student use of each of the elements of the intervention, refining implementation of the elements during each iteration (Cobb, Confrey, diSessa, Lehrer, & Schauble, 2003). Figure 1 (see Appendix B) illustrates the process used. In each content area there were 3 iterative cycles of teacher implementation and feedback as a means for determining feasibility and use. Following refinements a 4th cycle was conducted with implementation of the full, refined intervention.

Prior to the initial cycle of development and implementation, researchers developed an intervention prototype for building student independence in critical reading and improving content acquisition. The materials were developed based on previous work completed by the research team as well as observations of typical instruction in the classrooms. Teacher meetings were held generally one week prior to implementation of the prototype materials. A total of four all-day teacher meetings were held. At the initial meeting, teachers were asked about their

typical practice and to identify barriers to adolescents' reading comprehension. At following meetings, the first block of time was devoted to teacher feedback on previously implemented practices. Next, researchers shared prototype lesson plans and student materials to implement the practices for 1-2 weeks. Instruction in the strategies was provided if it was deemed necessary by research personnel. Changes and modifications based on previous feedback were highlighted. Researcher personnel and teachers then applied the prototype strategies and materials to text and content the teachers would be teaching during the next round of implementation. Lastly, teachers suggested additional modifications to the materials. After implementation, teachers participated in a focus group in which they provided specific feedback on the materials implemented. They also suggested modifications for future intervention versions.

Data Collection and Analysis:
Data sources were at the teacher level and consisted of lesson feedback forms, focus groups, and in-classroom observations. Lesson feedback forms were completed by teachers following each implementation. All intervention components were listed and teachers rated their level of implementation as "very effective", "somewhat effective", "not effective", or "did not implement today. Teacher focus groups were also held following each round of implementation. Focus groups were approximately one hour each and were audio recorded. Teachers responded to questions such as: (1) Briefly describe your experiences implementing the module; (2) How are the activities in the module similar to activities you typically use in the classroom? In what ways are they different?; (3) How did the planning time for this module compare to "typical" lesson planning time? (4) What was the impact from implementing this module on the following: student participation? quality of student work?

Teachers were observed in person at least once per implementation cycle. In addition, audio recordings of instruction during implementation were collected. Observations were conducted during one class period (approximately 50 minutes) of implementation. In addition, observations of teachers' typical instructional practices were conducted at least 8 times during the school year. Observations focused on instruction and components of the intervention implemented, the amount of time implemented, and if the activity was connected to text. Other information recorded included: type of text, type of reading (i.e., teacher read aloud, whole group, small group, partner, individual, and audio recorded) and number of minutes, technology used (i.e., power point, interactive blackboard, document camera, audio or video clips), and a rating of student engagement (i.e., few, some, many, most).

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Qualitative Analysis. All data sources (e.g., audio recordings, field notes, notes of focus groups) were analyzed to determine which instructional methods and materials were most feasible and effective in the middle and high school classrooms. Using information sources from the first round of implementation, data was scanned for common categories of phenomena and themes were developed based on this information. These themes were then used to analyze data at each implementation data point, and refine materials for the following cycles of implementation.

Quantitative Analysis. Data from in-person observations, lesson feedback forms, and audio taped observations was summarized and reported. This descriptive data includes frequency counts and averages.

Findings / Results:

English Language Arts Findings. Findings from the design experiments and teacher input provided extensive information regarding intervention prototype refinements. Several important recommendations emerged regarding changes to prototype interventions including (a) routines that transfer to novels and informational text, (b) increased focus on comprehension fix-up strategies, (c) lessons that explicitly teach inference-making, (d) several options for vocabulary instruction, (e) lessen emphasis on classwide discussion and increase mini-discussions during reading, (f) incorporate more extensive writing assignments, (g) increase emphasis on documenting and using textual evidence.

Social Studies Findings. Findings from the design experiments and observations of typical practice identified key areas for intervention refinement in the social studies classes including, (a) expansion of vocabulary instruction in the intervention to go beyond simple definitions which were the typical practice for teachers in 51% of the observations, (b) increased supported text reading and strategies for learning content from text (text was used in typical practice only 10% of observed time), (c) expanding text comprehension instruction beyond oral questioning (used 76% of the time in typical practice), (d) increasing active student engagement in using text, discussion and problem solving about content, and identifying text evidence to support arguments, answers, and opinions, (e) providing several high quality, complex text options for instruction, (f) identifying multiple examples of broad, essential content related questions to elicit quality student discussion and deep processing of content and readings, (g) structured student discussion that includes student recording of key points and evidence.

Conclusions:
The design experiment methodologies provided extensive and important feedback into how to design and refine interventions. The teacher level data collection assisted in key refinements to the intervention to allow for increased fidelity and feasibility of implementation in ways that addressed both content learning and reading for understanding. The design experiment methodologies provided extensive and important feedback into how to design and refine interventions. We learned that collaborations with teachers were important but nonetheless challenging as there were diverse positions on what should be taught and practices that could be used. In the English language arts design experiments we learned there must be a base routine that can be adapted for different text genres. In addition, comprehension practices must be flexible and adaptable as there is no standard scope and sequence in which text types are introduced. In social studies, efficient practices and scaffolds were required for teachers to successfully facilitate reading of complex text within their content instruction and with a wide range of reading abilities Our observations led us to believe that more work was needed to structure successful peer-mediated activities and discussions. Few teachers were prepared to relinquish significant amounts of instructional time to student/partner-regulated strategies. We learned that developing an intervention that maps onto existing curriculum requires navigating and orchestrating may factors including differences by grades, heterogeneity in classrooms, and teacher preferences.

Appendices

Appendix A. References

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Appendix B Tables and Figures

Figure 1. Iterative Design Cycle